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Indian Standard
SPECIFICATION FOR STEARIC ACID, TECHNICAL
(First Revision)

Fifth Reprint SEPTEMBER 2007
(Including Amendment No 1)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3

January 1973

AMENDMENT NO. 1 MAY 1982

TO

IS : 1675 - 1971 SPECIFICATION FOR STEARIC ACID, TECHNICAL

(First Revision)

[Requirements for Type 1 of the material in this specification intended for use of cosmetic industry has now been covered in IS : 9681-1980 'Specification for stearic acid for cosmetic industry'. The technical committee responsible for preparing this standard therefore decided to issue this amendment.]

Alterations

(*Page* 3, *clause* 0.2, *lines* 6 *and* 7) — Substitute 'Types 3 and 4' *for* 'Types 4 and 5'.

(*Page* 4, *clause* 2.1) — Substitute the following for the existing text:

'**2.1** The material shall be of four types, namely, Type 1, Type 2, Type 3 and Type 4. Generally Types 1 and 2 of the material are used for the textile industry, and Types 3 and 4 for the rubber industry.'

(*Page* 4, *clause* 3.1, *fourth sentence*) — Substitute the following for the existing sentence:

'It shall be glossy.'

(*Page* 4, *Table* 1):

a) *Column* 3 — Delete and renumber the subsequent columns accordingly.

b) *Columns* 3 *to* 8, *heading* — Substitute the following for the existing column headings:

REQUIREMENT				METHOD OF TEST, REF TO CL NO. IN	
Type 1	Type 2	Type 3	Type 4	Appendix A	IS : 548 (Part I)-1964*
(3)	(4)	(5)	(6)	(7)	(8)

c) *Foot-note with* '*' *mark* — Substitute the following for the existing foot-note:

'*Methods of sampling and test for oils and fast: Part I Sampling, physical and chemical tests (*revised*).'

(CAFDC 5)

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Indian Standard

SPECIFICATION FOR STEARIC ACID, TECHNICAL

(First Revision)

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Indian Standard

SPECIFICATION FOR STEARIC ACID, TECHNICAL

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 31 August 1971, after the draft finalized by the Oils and Oilseeds Sectional Committee had been approved by the Chemical Division Council and the Agricultural and Food Products Division Council.

0.2 Stearic acid is used in the manufacture of various products, such as rubber, textile auxiliaries, cosmetics, metallic stearates, and plastics and leather goods. Taking into consideration the requirements of the different grades of the material being manufactured and used in the country, this standard was originally issued in 1960. In this revision, the grades have been renamed as types and the requirements for Types 4 and 5 which are used in the rubber industry have been modified, in particular the limits of saponification value, acid value, copper and ash.

0.3 The technical grades of stearic acid are manufactured to contain varying amounts of palmitic acid. It is for this reason that different types have different characteristics in respect of saponification value, iodine value and titre.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2 - 1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for stearic acid, technical.

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*Rules for rounding off numerical values (*revised*).

2. TYPES

2.1 The material shall be of five types, namely, Type 1, Type 2, Type 3, Type 4 and Type 5. Generally the material of Type 1 is used for the cosmetic industry, Type 2 and Type 3 for the textile industry, and Type 4 and Type 5 for the rubber industry.

3. REQUIREMENTS

3.1 Description — Stearic acid, technical, shall be the product obtained from the solid fatty acids by the hydrolysis of various fats. It shall be in the form of powder, flakes or slabs. It shall be free from adulterants and foreign matter. It shall be glossy and the material conforming to Type 1 shall be crystalline to the naked eye. When melted, it shall form a clear and transparent liquid

3.2 The material shall also comply with the requirements given in Table 1.

TABLE 1 REQUIREMENTS FOR STEARIC ACID, TECHNICAL

(*Clauses* 3.2 *and* 7.1)

Sl No	Characteristic	Requirement					Method of Test, Ref to Cl No in	
		Type 1	Type 2	Type 3	Type 4	Type 5	Appendix A	IS : 548-1964*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Saponification value	207 to 212	197 *Min*	196 *Min*	195 *Min*	193 *Min*	—	15
ii)	Acid value, shall not differ from saponification value by more than	3	5	5	15	15	—	7†
iii)	Iodine value (Wijs) *Max*	3·0	3·0	10	15	25	—	14
iv)	Mineral acidity	To pass the test					A-2	—
v)	As, percent by mass, *Max*	0·1	0·1	0·1	0·1	0·1	A-3	—
vi)	Titre, °C	53 to 56	61 *Min*	55 *Min*	49 *Min*	46 *Min*	—	12
vii)	Colour reading in 5¼-in cell on the Lovibond scale, *Max*‡	(2·0 Y +0·5 R)	(3·0 Y +1·0 R)	(3·0 Y +1·0 R)	—	—	—	13
viii)	Heavy metals (as Pb) parts per million, *Max*	20	—	—	—	—	A-4	—
ix)	Copper (as Cu), parts per million, *Max*	1	—	—	10	10	A-5	—

*Method of sampling and test for oils and fats (*revised*).

†Ensure complete dissolution and titrate while hot

‡On melted sample

4. PACKING

4.1 The material shall be supplied in suitable containers as agreed to between the purchaser and the supplier.

5. MARKING

5.1 The containers shall be securely closed and legibly and indelibly marked with the following information:

a) Manufacturer's name;
b) Recognized trade-mark, if any;
c) Name and type of the material;
d) Mass of the material in the container;
e) Month and year of manufacture; and
f) Batch number in code or otherwise to enable the lot of manufacture to be traced from records.

5.1.1 The containers may also be marked with Standard Mark.

5.1.2 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6. SAMPLING

6.1 Representative samples of the material shall be drawn as prescribed in Appendix B.

7. TESTS

7.1 Tests shall be carried out by the methods prescribed in IS : 548-1964* and in Appendix A.

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*Methods of sampling and test for oils and fats (*revised*).

APPENDIX A

(*Table* 1, and *Clause* 7.1)

TESTS FOR MINERAL ACIDITY, ASH, HEAVY METALS AND COPPER

A-1. QUALITY OF REAGENTS

A-1.1 Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1960*) shall be employed in tests.

Note — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

A-2. TEST FOR MINERAL ACIDITY

A-2.1 Reagents

A-2.1.1 *Petroleum Ether* — 60/80°C grade.

A-2.1.2 *Methyl Orange Indicator* — 0·05 percent (*m/v*) solution.

A-2.2 Procedure — Measure 10 ml of the melted sample into a separating funnel and shake intimately with three successive 10-ml portions of hot water. The temperature of the hot water should be more than the melting point of stearic acid. Combine the aqueous extracts, transfer to another separating funnel and remove traces of fatty acids in the water by extraction with petroleum ether. Test the aqueous extract with a few drops of methyl orange indicator.

A-2.2.1 The material shall be taken to have passed the test if the indicator does not show acid reaction.

A-3. DETERMINATION OF ASH

A-3.1 Apparatus

A-3.1.1 *Platinum Crucible (or Silica Dish)*

A-3.1.2 *Desiccator* — containing an efficient desiccant, such as fused calcium chloride.

A-3.2 Procedure — Weigh accurately about 10 g of the material into a platinum crucible (or silica dish) which has been previously ignited, cooled in the desiccator and weighed. Dry the material in the crucible at 90 ± 2°C for 2 hours. Then heat over a low flame and ignite the contents gently. Incinerate the residue in a muffle furnace at 550 ± 10°C until

---

*Specification for water, distilled quality (*revised*).

free from carbon. Cool the crucible in a desiccator and weigh. Repeat the above procedure of heating, cooling and weighing until the difference between two successive weighings does not exceed 1 mg. Preserve the ash for test in **A-4**.

A-3.3 Calculation

$$\text{Ash, percent by mass} = \frac{100\,m}{M}$$

where

m = mass in g of the ash, and
M = mass in g of the material taken for the test.

A-4. TEST FOR HEAVY METALS

A-4.1 Apparatus

A-4.1.1 *Nessler Cylinders* — 50 ml capacity.

A-4.2 Reagents

A-4.2.1 *Concentrated Hydrochloric Acid* — conforming to IS : 265-1962*.

A-4.2.2 *Concentrated Nitric Acid* — conforming to IS : 264-1968†.

A-4.2.3 *Acetic Acid* — 1 N.

A-4.2.4 *Ammonium Chloride*

A-4.2.5 *Standard Lead Solution* — Dissolve 1·600 g of lead nitrate in water, add 1 ml of concentrated nitric acid (conforming to IS : 264-1968†) and make up the volume to 1 000 ml. Pipette out 10 ml of the solution and dilute again to 1 000 ml with water. One millilitre of solution contains 0·01 mg of lead (as Pb).

A-4.2.6 *Hydrogen Sulphide Solution* — freshly prepared saturated solution.

A-4.3 Procedure — Extract the ash, as obtained in **A-3.2**, with 1 ml of concentrated hydrochloric acid and transfer to an evaporating dish after washing a number of times with water. Add 0·5 ml of concentrated nitric acid and evaporate to dryness over a steam-bath. Dissolve the residue in 20 ml of water and 8 ml of acetic acid, and dilute to 250 ml with water. Mix well and filter. Transfer 25 ml of the filtrate to the Nessler cylinder and add 1 g of ammonium chloride in it. Carry out a control test in an other Nessler cylinder using 2·0 ml of standard lead solution in place of

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*Specification for hydrochloric acid (*revised*).
†Specification for nitric acid (*first revision*).

the material and 1 g of ammonium chloride and 1 ml of acetic acid. To each Nessler cylinder add 10 ml of hydrogen sulphide solution, dilute to the mark and shake well. Compare the intensity of colour produced in the two cylinders.

A-4.3.1 The limit prescribed in Table 1 shall be taken as not having been exceeded if the intensity of the colour obtained with the material is not greater than that obtained in the control test.

A-5. TEST FOR COPPER

A-5.1 Apparatus

A-5.1.1 *Nessler Cylinders* — 50 ml capacity.

A-5.2 *Reagents*

A-5.2.1 *Dilute Hydrochloric Acid* — approximately 0·5 N.

A-5.2.2 *Citric Acid Solution* — approximately 10 percent.

A-5.2.3 *Ammonium Hydroxide* — approximately 1 : 4 (*V/v*).

A-5.2.4 *Sodium Diethyldithiocarbamate Solution* — Dissolve 0·1 g of sodium diethyldithiocarbamate in 100 ml of copper-free water. Filter, if necessary. Preserve in an amber-colour glass bottle and store in a dark place. This solution should not be used after two weeks.

A-5.2.5 *Extraction Solvent* — Two alternative extraction solvents, amyl alcohol and carbon tetrachloride, are prescribed. It is permitted to use any one of them.

A-5.2.6 *Standard Copper Solution* — Dissolve 0·392 8 g of copper sulphate pentahydrate ($CuSO_4.5H_2O$) in 1 000 ml of copper-free water. Pipette out 10 ml of this solution and dilute to 1 000 ml. One millilitre of the diluted solution contains 0·001 mg of copper (as Cu). The diluted solution should be freshly prepared before use.

NOTE — The purity of the salt should be checked before use.

A-5.3 Procedure — Take about 10·000 g of the material of Type 1 or 1·000 g of the material of Types 4 and 5, melt it and extract with hot dilute hydrochloric acid three or four times. Evaporate the acid. Cool and add 2·5 ml of citric acid solution. Neutralize the acidity with ammonium hydroxide and add 10 ml in excess, followed by 10 ml of sodium diethyldithiocarbamate solution. Transfer the solution to a separating funnel, stir and allow to stand for 5 minutes. Extract the yellow colour produced with 10 ml of the extraction solvent and collect the extractant in a Nessler cylinder and dilute to the mark. Carry out a control test using 10 ml of standard copper solution, proceeding exactly as for the material under test and collect the extractant in another Nessler cylinder. Compare the intensity of the colour produced in the two cylinders.

A-5.3.1 The limit laid down in Table 1 shall be taken as not having been exceeded if the intensity of colour produced with the material is not greater than that produced in the control test.

APPENDIX B

(*Clause* 6.1)

SAMPLING OF STEARIC ACID, TECHNICAL

B-1. GENERAL REQUIREMENTS OF SAMPLING

B-1.0 In drawing, preparing, storing and handling test samples, following precautions and directions shall be observed.

B-1.1 Samples shall not be taken in an exposed place.

B-1.2 The sampling instrument shall be clean and dry.

B-1.3 Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contamination.

B-1.4 To draw a representative sample, the contents of each container selected for sampling shall be mixed as thoroughly as possible by suitable means.

B-1.5 The samples shall be placed in clean, dry glass stoppered bottles.

B-1.6 The sample containers shall be of such a size that they are almost completely filled by the sample.

B-1.7 Each sample container shall be sealed air-tight after filling and marked with full details of sampling, the date of sampling and the year and month of manufacture of the material.

B-1.8 Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the normal temperature.

B-2. SCALE OF SAMPLING

B-2.0 Samples to determine conformity of the material to this specification shall be selected in accordance with the procedure given below. However, the purchaser and the supplier may agree to adopt any other procedure.

B-2.1 Lot — All the containers in a single consignment of one type of the material drawn from a single batch of manufacture shall constitute a lot. If a consignment is declared to consist of different batches of manufacture, the batches shall be marked separately and the groups of containers in each batch shall constitute separate lots.

B-2.2 The number of containers to be selected from a lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 2.

TABLE 2 NUMBER OF CONTAINERS TO BE SELECTED

LOT SIZE N (1)	NUMBER OF CONTAINERS TO BE SELECTED n (2)
Up to 5	All*
6 ,, 65	5
66 ,, 110	7
Over 110	10

*When the lot size is 5 or less, the test results of each of the samples shall meet the corresponding requirements.

B-2.3 These containers shall be selected at random from the lot*. In order to ensure randomness, the following procedure may be adopted:

> Arrange all the containers in the lot in a systematic manner and starting from any container, count them as 1, 2, 3,... . . , up to r and so on, where r is the integral part of N/n. Every rth containers thus counted shall be withdrawn from the lot.

B-3. TEST SAMPLES AND REFEREE SAMPLE

B-3.1 Draw with an appropriate sampling instrument small portions of the material from different parts of the selected containers, the total quantity being sufficient to carry out the tests for all characteristics given in Table 1.

B-3.2 Mix thoroughly all portions of the material drawn from the same container to form an individual sample to represent the container. Equal quantities from the selected containers shall be mixed together to form a composite sample to represent the lot.

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*See IS : 4905-1968 ' Methods for random sampling '.

B-3.3 All the individual samples representing the selected containers and the composite sample representing the lot shall be divided into three equal parts, thus forming three sets of test samples. These parts shall be immediately transferred to thoroughly dried bottles which shall then be sealed air-tight with glass stoppers. These shall be labelled with all the particulars of sampling given in **B-1.7**. One set of the test samples shall be sent to the purchaser and one to the supplier.

B-3.4 Referee Sample — The third set of the test samples, bearing the seals of the purchaser and the supplier shall constitute the referee sample and shall be used in case of dispute between the purchaser and the supplier. It shall be kept at a place agreed to between them.

B-4. NUMBER OF TESTS

B-4.1 The tests for saponification value, acid value and titre (*see* Table 1) shall be carried out on each individual sample of the set of test samples (*see* **B-3.3**).

B-4.2 The tests for the remaining characteristics given in Table 1 shall be carried out on the composite sample of the set of test samples (*see* **B-3.3**)

B-5. CRITERIA FOR CONFORMITY

B-5.1 A lot shall be considered as conforming to this specification if it satisfied the criteria in **B-5.2.1** and **B-5.3** for the characteristics given in Table 1.

B-5.2 The test results for saponification value, acid value and titre shall be recorded as shown in Table 3. The mean and the range shall be calculated as follows and shall be recorded in col 3 and 4 respectively of Table 3.

$$\text{Mean } (\bar{X}) = \frac{\text{The sum of the test results}}{\text{Number of test results}}$$

Range (R) = The difference between the maximum and the minimum values of the test results.

B-5.2.1 The value of expressions $\bar{X} \pm 0{\cdot}6\,R$ shall be calculated. The lot shall be considered to have satisfied the requirement for a characteristic if the condition given in col 5 of Table 3 is satisfied.

TABLE 3 CRITERION FOR CONFORMITY

(*Clauses* B-5.2 *and* B-5.2.1)

SL No.	CHARACTERISTIC	TEST RESULTS		CRITERIA FOR CONFORMITY
		Mean	Range	
(1)	(2)	(3)	(4)	(5)
i)	**Saponification value**	X_1	R_1	a) For Type 1 — The value of $\bar{X}_1 \pm 0{\cdot}6\ R_1$ shall lie between 207 and 212
				b) For Types 2 to 5 — The value of $\bar{X} - 0{\cdot}6\ R$ shall be greater than or equal to value specified in Table 1
ii)	Acid value	X_2	—	$X_1 - X_2 <$ value specified in Table 1
iii)	Titre	X_3	R_3	a) For Type 1 — The value of $\bar{X}_3 \pm 0{\cdot}6\ R_3$ shall lie between 53 and 56
				b) For Types 2 to 5 — Value of $\bar{X}_3 - 0{\cdot}6\ R_3$ shall be greater than or equal to value specified in Table 1

B-5.3 The composite sample when tested for the remaining characteristics not tested in **B-5.2** shall satisfy the corresponding requirements for them as specified in Table 1.

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